

CLAIMS

We claim:

1. A circuit board assembly comprising:
a first circuit board having a first aperture therethrough;
5 a second circuit board having a second aperture therethrough, the
second circuit board disposed generally parallel to the first circuit
board such that the second aperture is generally aligned with the
first aperture; and
a solder joint extending into the first aperture and the second aperture.
- 10 2. The circuit board assembly of claim 1 wherein the first aperture has a
first diameter and the second aperture has a second diameter.
3. The circuit board assembly of claim 2 wherein the first diameter and
the second diameter are greater than about .01 inches and less than about .04 inches.
4. The circuit board assembly of claim 2 wherein the first diameter and
15 the second diameter are substantially equal to .022 inches.
5. The circuit board assembly of claim 2 wherein the first diameter is
different from the second diameter.
6. The circuit board assembly of claim 5 wherein the ratio of the first
diameter to the second diameter is greater than 70 percent and less than 130 percent.

7. The circuit board assembly of claim 5 wherein the ratio of the first diameter to the second diameter is greater than about 90 percent and less than about 110 percent.
- 5 8. The circuit board assembly of claim 1 wherein the first circuit board is adjacent the second circuit board.
9. The circuit board assembly of claim 1 wherein the first circuit board and the second circuit board are spaced to define a gap therebetween.
10. The circuit board assembly of claim 9 wherein the gap is less than about .006 inches at or near the solder joint.
- 10 11. The circuit board assembly of claim 9 wherein the gap is substantially equal to .002 inches at or near the solder joint.
12. The circuit board assembly of claim 1 further including a copper layer coating the first aperture and the second aperture.
- 15 13. The circuit board assembly of claim 1 wherein the solder joint is comprised of a combination of solder and flux.
14. The circuit board assembly of claim 13 wherein the solder is comprised of greater than about 1 and less than about 10 percent flux by weight.
15. The circuit board assembly of claim 13 wherein the solder is comprised of about 2 percent flux by weight.
- 20 16. The circuit board assembly of claim 1 wherein either or both of the first circuit board and the second circuit board are printed with conductive traces.

17. The circuit board assembly of claim 16 wherein the conductive traces of the first circuit board are electrically coupled to the conductive traces of the second circuit board by the solder joint.
- 5 18. The circuit board assembly of claim 1 wherein the solder joint is visible at the first aperture and at the second aperture.
19. The circuit board assembly of claim 1 further comprising an implantable medical device comprising a housing and a battery located in the housing.
- 10 20. An implantable medical device comprising a housing, a battery located in the housing, a first circuit board having a first aperture, a second circuit board having a second aperture, the second circuit board disposed such that the first aperture is generally aligned with the second aperture, and a solder joint extending into the first aperture and the second aperture.
- 15 21. The device of claim 20 wherein the device is a cardiac rhythm management device.
22. The circuit board assembly of claim 21 wherein the first aperture has a first diameter and the second aperture has a second diameter.
23. The circuit board assembly of claim 22 wherein the first diameter is equal to the second diameter.
- 20 24. The circuit board assembly of claim 23 wherein the first diameter and the second diameter are substantially equal.
25. The circuit board assembly of claim 23 wherein the first diameter and the second diameter are greater than about .01 inches and less than about .04 inches.

26. The circuit board assembly of claim 22 wherein the first diameter is different from the second diameter.
27. The circuit board assembly of claim 26 wherein the ratio of the first diameter to the second diameter is greater than about 70 percent and less than about 130 percent.
28. The circuit board assembly of claim 26 wherein the ratio of the first diameter to the second diameter is greater than about 90 percent and less than about 110 percent.
29. The circuit board assembly of claim 21 wherein the first circuit board is adjacent the second circuit board.
30. The circuit board assembly of claim 21 further including a gap defined between the first circuit board and the second circuit board.
31. The circuit board assembly of claim 30 wherein the gap is less than about .006 inches at or near the solder joint.
32. The circuit board assembly of claim 30 wherein the gap is substantially equal to .002 inches at or near the solder joint.
33. The circuit board assembly of claim 21 further including a copper layer coating the first aperture and the second aperture.
34. The circuit board assembly of claim 21 wherein the solder joint is comprised of a combination of solder and flux.
35. The circuit board assembly of claim 34 wherein the solder is comprised of greater than about 1 percent and less than about 10 percent flux by weight.

36. The circuit board assembly of claim 34 wherein the solder is comprised of approximately 2 percent flux by weight.
37. The circuit board assembly of claim 21 wherein either or both of the first circuit board and the second circuit board are printed with conductive traces.
- 5 38. The circuit board assembly of claim 37 wherein the conductive traces of the first circuit board are electrically coupled to the conductive traces of the second circuit board at the solder joint.
39. The circuit board assembly of claim 21 wherein the solder joint is visible at the first aperture and at the second aperture.
- 10 40. A method of coupling a first circuit board having a first aperture to a second circuit board having a second aperture to provide a circuit board assembly for an implantable medical device, the method comprising:
- aligning the first aperture with the second aperture;
- providing an amount of solder at the first aperture; and
- 15 applying heat to the first aperture for a period of time sufficient to cause the solder to flow into the second aperture.
41. The method of claim 40 including the further steps of providing a gap between the first circuit board and the second circuit board and allowing the solder to wick into the gap.
- 20 42. The method of claim 40 wherein heat is applied for a period of time up to 4 seconds.
43. The method of claim 40 further comprising:

allowing the solder to harden; and

visually inspecting the solder at the first aperture and at the second aperture.

5 44. The method of claim 40 wherein the amount of solder is a solder core and further wherein the solder core is provided at least partially within the first aperture prior to the step of applying heat.

45. The method of claim 40 wherein the applying step is performed before the step of providing solder.

10 46. The method of claim 40 wherein the first circuit board and the second circuit board are provided with a layer of solder adjacent the first aperture and the second aperture.